UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P O Box 1450
Alexandria, Virginia 22313-1450
www uspto gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/518,845	12/21/2004	Marie Jacob	FR 020067	1286

24737 7590 06/16/2009
PHILIPS INTELLECTUAL PROPERTY & STANDARDS
P.O. BOX 3001
BRIARCLIFF MANOR, NY 10510

EXAMINER	
PARK, EDWARD	

ART UNIT	PAPER NUMBER
2624	

MAIL DATE	DELIVERY MODE
06/16/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/518,845	JACOB ET AL.	
	Examiner	Art Unit	
	EDWARD PARK	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 April 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12 and 14-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11,14 and 16-21* is/are rejected.

7)☒ Claim(s) *12 and 15* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. This action is responsive to applicant's amendment and remarks received on 4/3/09. Claims 1-12, 14-21 are currently pending.

Response to Arguments

2. Applicant's arguments filed on 4/3/09, in regards to claim 1, have been fully considered but they are not persuasive. Applicant argues that Metaxas does not disclose processing means for processing the 3D object data in the images of the sequence for locating the 3D object wall by defining regions of interest on the 3D object wall (see pg. 9, first paragraph – pg. 10, first paragraph). This argument is not considered persuasive since Metaxas discloses the limitation within, fig. 4, col. 9, lines 44-61, col. 4, lines 40-60, model can be tessellated so that each volume element 201-203 has its triangular faces 204, 205 at the LV's inner and outer walls 206, 207, respectively, a three-dimensional representation of dynamic shape modeling, dynamic motion modeling, or both. Examiner notes that even the applicant admits that the 3D object wall is defined by regions of interest on the 3D object wall within the applicant's argument, see pg. 9, last paragraph, where elements 201-203 can be juxtaposed to create uniform discrete volumes for the entire model surface. Examiner notes that the claim limitation calls for identifying the 3D object wall by identifying regions of interest within the 3D wall, which is clearly taught as mentioned above. Applicant further argues that the Metaxas reference does not disclose processing the image data of the 3D object wall to determine the amplitude of displacement of

each of the said regions of interest as a function of time (see pg. 9, first paragraph – pg. 10, third paragraph). This argument is not considered persuasive since Metaxas teaches this limitation within fig. 9a-c, col. 12, lines 45-62; typical motion of an LV model observed at two subsequent time instances, T and T+1, model frames 300, 301, respectively, which shows that the motion at the apex of the LV is relatively small, relatively uniform longitudinal contraction from apex to base can be captured. Examiner notes that the limitation only calls for identifying the change in displacement for the 3D object wall which is clearly show within the cited limitation. Applicant further argues that Metaxas does not disclose constructing a first 2D simplified representation of the 3D object wall by projection of the 3D object wall along an axis, with the projections of the regions of interest in the 2D simplified representation (see pg. 9, first paragraph - pg. 10, fifth paragraph). This argument is not considered persuasive since Metaxas discloses this limitation within fig. 9a-c, col. 12, lines 28-67, col. 13, lines 1-18 where long-axis views generally coincide with yz-plane 261, the parameter function a3 can capture the longitudinal contraction motion, global translation in the x and the y directions 275, 274, respectively, of the model 2262 frame can be negligible, fig. 9a, a typical motion of an LV model observed at T and T+1, a relatively uniform longitudinal contraction from apex to base can be captured. Examiner notes that the limitation calls for projecting a 3D object wall as a 2D representation which is clearly shown above by Metaxas within the cited passage.

Regarding claim 11, applicant argues that the claim is allowable due to the same reasons as stated for claim 1 (see pg. 10, sixth paragraph). This argument is not considered persuasive since claim 1 stands rejected and the arguments and rejection can be seen within this action.

Regarding claims 2-10, 12-14, 15, applicant argues that the claims are allowable due to the dependency from claims 1, 11, respectively (see pg. 10, last paragraph). This argument is not considered persuasive since claims 1, 11 stand rejection and the arguments and rejections can be seen within this action.

Claim Rejections - 35 USC § 101

3. In response to applicant's amendment of claim 11, the amendment does not overcome the previous 101 rejection. The examiner notes that the current amendment does not recite a method process that is tied to a particular machine. This explanation is elaborated in the 101 rejection below.

4. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 11, 12, 14, 15 are rejected under 35 U.S.C. 101 as not falling within one of the four statutory categories of invention. The Federal Circuit[1], relying upon Supreme Court precedent[2], has indicated that a statutory "process" under 35 U.S.C. 101 must (1) be tied to a particular machine or apparatus, or (2) transform a particular article to a different state or thing. This is referred to as the "machine or transformation test", whereby the recitation of a particular machine or transformation of an article must impose meaningful limits on the claim's scope to impart patent-eligibility (See *Benson*, 409 U.S. at 71-72), and the involvement of the machine or

---

[1] *In re Bilski*, 88 USPQ2d 1385 (Fed. Cir. 2008).

[2] *Diamond v. Diehr*, 450 U.S. 175, 184 (1981); *Parker v. Flook*, 437 U.S. 584, 588 n.9 (1978); *Gottschalk v. Benson*, 409 U.S. 63, 70 (1972); *Cochrane v. Deener*, 94 U.S. 780, 787-88 (1876).

transformation in the claimed process must not merely be insignificant extra-solution activity (See *Flook*, 437 U.S. at 590"). While the instant claim(s) recite a series of steps or acts to be performed, the claim(s) neither transform an article nor are positively tied to a particular machine that accomplishes the claimed method steps, and therefore do not qualify as a statutory process. That is, the method includes steps of acquiring, , etc. is of sufficient breadth that it would be reasonably interpreted as a series of steps completely performed mentally, verbally, or without a machine. The cited claims do not positively recite any structure within the body of the claim which ties the claim to a statutory category. Furthermore, the examiner suggests that the structure needs to tie in the basic inventive concept of the application to a statutory category. Structure that ties insignificant pre or post solution activity to a statutory category is not sufficient in overcoming the 101 issue. Additionally, the limitations do not claim data that represents a physical object or substance, the data representing the physical object is not present and therefore can not be modified by the process in a meaningful or significant manner, and no meaningful and significant external, non-data depiction of a physical object or substance is produced. Thus, the limitations do not satisfy the transformation test.

[1] *In re Bilski*, 88 USPQ2d 1385 (Fed. Cir. 2008).

[2] *Diamond v. Diehr*, 450 U.S. 175, 184 (1981); *Parker v. Flook*, 437 U.S. 584, 588 n.9 (1978); *Gottschalk v. Benson*, 409 U.S. 63, 70 (1972); *Cochrane v. Deener*, 94 U.S. 780, 787-88 (1876).

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. **Claims 16, 19** are rejected under 35 U.S.C. 102(b) as being anticipated by Metaxas (US 6,295,464 B1).

Regarding **claim 16**, Metaxas discloses a computer-readable storage medium, comprising computer executable instructions (see fig. 15) for processing ultrasound image data and for displaying an ultrasound image of a deformable 3D organ with indications of the organ wall motions, the computer executable instructions causing an image processing device to:
acquire image data of an image sequence of the organ under study (see fig. 15, numeral 403, fig. 1a-e, col. 15, lines 45-62, col. 6, lines 66-67, col. 7, lines 1-18; material points 401 on the surface of and within object 402 are detected by sensor 403, sensor 403 generates a plurality of signals 404 that correspond to respective material points 401; if tissue imaging is continued after the saturation pulse sequence is applied, those dark lines can e seen to move, thereby allowing the tracking of the underlying tissue motion);
segment the 3D organ in the images of the sequence for locating the 3D object wall (see fig. 4, col. 9, lines 44-61, col. 4, lines 40-60; model can be tessellated so that each volume element 201-203 has its triangular faces 204, 205 at the LV's inner and outer walls 206, 207, respectively);
define regions of interest on the segmented 3D organ wall (see fig. 6, col. 9, lines 61-67, col. 10, lines 1-5, forces from each boundary data point P, 220, to the corresponding model wall (inner or

outer) can be computed by approximating each boundary triangular element with a plane 223); and

process the image data to determine the amplitude of displacement of each of said regions of interest as a function of time (see fig. 9a-c, col. 12, lines 45-62; typical motion of an LV model observed at two subsequent time instances, T and T+1, model frames 300, 301, respectively, which shows that the motion at the apex of the LV is relatively small, relatively uniform longitudinal contraction from apex to base can be captured).

Regarding **claim 19**, Metaxas discloses construct a second 2D simplified representation of the 3D segmented organ wall, similar to the first 2D simplified representation of the 3D segmented organ wall, this second 2D simplified representation being called 2D simplified phase representation time (see fig. 9a-c, col. 12, lines 28-67, col. 13, lines 1-18; long-axis views generally coincide with yz-plane 261, the parameter function a3 can capture the longitudinal contraction motion, global translation in the x and the y directions 275, 274, respectively, of the model 2262 frame can be negligible, fig. 9a, a typical motion of an LV model observed at T and T+1, a relatively uniform longitudinal contraction from apex to base can be captured).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. **Claims 1-11, 14, 17, 18, 20, 21** are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Metaxas (US 6,295,464 B1) in view of Ryals et al (US 5,803,914).

Regarding **claim 1, 2**, Metaxas discloses an image processing system for displaying information relating to the amplitude of displacements of wall regions of a deformable 3D object under study, the system comprising:

acquisition means for acquiring image data of an image sequence of the 3D object under study (see fig. 15, numeral 403, fig. 1a-e, col. 15, lines 45-62, col. 6, lines 66-67, col. 7, lines 1-18; material points 401 on the surface of and within object 402 are detected by sensor 403, sensor 403 generates a plurality of signals 404 that correspond to respective material points 401; if tissue imaging is continued after the saturation pulse sequence is applied, those dark lines can e seen to move, thereby allowing the tracking of the underlying tissue motion);

processing means for:

processing the 3D object data in the images of the sequence for locating the 3D object wall (see fig. 4, col. 9, lines 44-61, col. 4, lines 40-60; model can be tessellated so that each volume element 201-203 has its triangular faces 204, 205 at the LV's inner and outer walls 206, 207, respectively),

defining regions of interest on the object wall (see fig. 6, col. 9, lines 61-67, col. 10, lines 1-5, forces from each boundary data point P, 220, to the corresponding model wall (inner or outer) can be computed by approximating each boundary triangular element with a plane 223), and processing the image data of the 3D object wall to determine the amplitude of displacement of each of said regions of interest as a function of time (see fig. 9a-c, col. 12, lines 45-62; typical motion of an LV model observed at two subsequent time instances, T and T+1, model frames

300, 301, respectively, which shows that the motion at the apex of the LV is relatively small, relatively uniform longitudinal contraction from apex to base can be captured); and constructing a first 2D simplified representation of the 3D object wall by projection of the 3D object wall along an axis, comprising the projections of the regions of interest in said 2D simplified representation, indications of the maximal or minimal amplitudes of displacements of the regions of interest over a period of time (see fig. 9a-c, col. 12, lines 28-67, col. 13, lines 1-18; long-axis views generally coincide with yz-plane 261, the parameter function a3 can capture the longitudinal contraction motion, global translation in the x and the y directions 275, 274, respectively, of the model 2262 frame can be negligible, fig. 9a, a typical motion of an LV model observed at T and T+1, a relatively uniform longitudinal contraction from apex to base can be captured).

Metaxas does not disclose displaying indications of the amplitudes of displacement of each of the regions of interest of the 3D object wall in the respective projections of said regions of interest, called segments, in said constructed 2D simplified representation.

Ryals teaches comprising display means for displaying indications of the amplitudes of displacement of each of the regions of interest of the 3D object wall in the respective projections of said regions of interest, called segments, in said constructed 2D simplified representation (see figure 15, numeral 1528, col. 48, lines 23-46).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Metaxas to display indications of amplitudes of displacement as suggested by Ryals, in order to provide an effective display system allowing efficient location, display and comparison of image frames of the multitude of image frames (see col. 5, lines 1-11).

Regarding **claims 3, 4**, Metaxas, with Ryals combination discloses all elements as mentioned above in claim 2. Metaxas with Ryals combination further discloses displaying indication of the instants of time at which the maximum or minimum of amplitudes of displacements occur in the regions of interest, over said period of time, in said 2D simplified phase representation (see Metaxas: figure 9a-9c; col. 12, lines 45-63). Metaxas, with Ryals combination as applied to claim 2 does not disclose constructing a second 2D simplified representation of the 3D object wall called 2D simplified phase representation; displaying 2D simplified phase representation; and means to display the 2D simplified amplitude representation and the 2D simplified phase representation together in a same image.

Ryals teaches constructing a second 2D simplified representation of the 3D object wall called 2D simplified phase representation; displaying 2D simplified phase representation (col. 5, lines 50-67; means for displaying a first image during diastolic phase of a cardiac cycle and systolic phase); and means to display the 2D simplified amplitude representation and the 2D simplified phase representation together in a same image (figure 13; col. 38, lines 27-48).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Metaxas with Ryals combination as applied to claim 2 to utilize a phase representation and display it simultaneously with the amplitude representation as suggested by Ryals, in order to provide an effective display system allowing efficient location, display and comparison of image frames of the multitude of image frames (see col. 5, lines 1-11).

Regarding **claim 5**, Metaxas, with Ryals combination discloses all elements as mentioned above in claim 4. Metaxas, with Ryals combination as applied to claim 4 does not teach display

the values of amplitude and of time in the respective 2D simplified amplitude representation in a color-coded manner.

Ryals teaches display the values of amplitude (figure 13, numeral 1370) and of time (figure 3, numeral 365) in the respective 2D simplified amplitude representation in a color-coded manner (figure 15, numeral 1528).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Metaxas with Ryals combination as applied to claim 4 to display indications of amplitudes of displacement in a color-coded manner as suggested by Ryals, in order to provide an effective display system allowing efficient location, display and comparison of image frames of the multitude of image frames (see col. 5, lines 1-11).

Regarding **claim 6**, Metaxas with Ryals combination discloses all elements as mentioned above in claim 1. Metaxas with Ryals combination as applied to claim 1 does not disclose means to display indications of the amplitudes of displacement of the regions of interest of the 3D object wall in the respective projections of the regions of interest, called segments, in said constructed 2D simplified representation, in a color-coded manner, the indications of the amplitudes of displacement changing in the segments at the rate of the images of the sequence, so as to form an animated 2D simplified representation as a function of time.

Ryals teaches means to display (figure 2, numeral 105) indications of the amplitudes of displacement of the regions of interest of the 3D object wall in the respective projections of the regions of interest, called segments, in said constructed 2D simplified representation, in a color-coded manner, the indications of the amplitudes of displacement changing in the segments at the

rate of the images of the sequence, so as to form an animated 2D simplified representation as a function of time (figure 13; col. 39, lines 39-67; col. 40, lines 1-67).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Metaxas with Ryals combination as applied to claim 1 to display indications of amplitudes of displacement in a color-coded manner as suggested by Ryals, in order to provide an effective display system allowing efficient location, display and comparison of image frames of the multitude of image frames (see col. 5, lines 1-11).

Regarding **claim 7**, Metaxas with Ryals combination discloses all elements as mentioned above in claim 1. Metaxas with Ryals combination as applied to claim 1 does not disclose means to display the 2D simplified representation of the 3-D object wall as 2D bull's eye representations.

Ryals, in the same field of endeavor, teaches means to display the 2D simplified representation of the 3-D object wall as 2D bull's eye representations (see fig. 14, col. 44, lines 55-67, col. 45, lines 1-67).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Metaxas with Ryals combination as applied to claim 1 to utilize a bull's eye representation as suggested by Ryals, in order to enhance "diagnosing cardiac disease and detecting ischemic areas that would otherwise be falsely identified as an infarct" (see col. 45, lines 38-56).

Regarding **claim 8**, Metaxas discloses a heart left ventricle and the regions of interest include the internal boundary of the left ventricle wall (see figures 9a-9c).

Regarding **claim 9**, Metaxas discloses segmentation means for operating a segmentation technique applied to the 3D object under study, which includes using a mesh model technique, and reshaping the mesh model for mapping said mesh model onto the wall of the 3D object under study, so as to provide a simplified volume with a wall, called object wall, that is the object of interest (see col. 7, lines 45-56).

Regarding **claim 10**, Metaxas discloses a suitably programmed computer (see fig. 15, numeral 400) or a special purpose process having circuit means, which are arranged to process image data as claimed in claim 1, and having means to display the processed images (see fig. 15, numerals 410, 411).

Regarding **claim 11**, Metaxas discloses an image processing method for processing ultrasound image data and for displaying an ultrasound image of a deformable 3-D organ with indication of the organ wall motions, wherein the method is performed by an image processing system, comprising steps of:

acquiring image data of an image sequence of the organ under study (see fig. 15, numeral 403, fig. 1a-e, col. 15, lines 45-62, col. 6, lines 66-67, col. 7, lines 1-18; material points 401 on the surface of and within object 402 are detected by sensor 403, sensor 403 generates a plurality of signals 404 that correspond to respective material points 401; if tissue imaging is continued after the saturation pulse sequence is applied, those dark lines can e seen to move, thereby allowing the tracking of the underlying tissue motion), segmenting the 3-D organ in the images of the sequence for locating the 3D object wall (see fig. 4, col. 9, lines 44-61, col. 4, lines 40-60; model can be tessellated so that each volume element 201-203 has its triangular faces 204, 205 at the LV's inner and outer walls 206, 207, respectively), defining regions of interest on the

segmented 3D organ wall (see fig. 6, col. 9, lines 61-67, col. 10, lines 1-5, forces from each boundary data point P, 220, to the corresponding model wall (inner or outer) can be computed by approximating each boundary triangular element with a plane 223), and processing the image data to determine the amplitude of displacement of each of said regions of interest as a function of time (see fig. 9a-c, col. 12, lines 45-62; typical motion of an LV model observed at two subsequent time instances, T and T+1, model frames 300, 301, respectively, which shows that the motion at the apex of the LV is relatively small, relatively uniform longitudinal contraction from apex to base can be captured);

constructing a first 2D simplified representation of the 3D segmented organ wall by projection of the 3D segmented organ wall along an axis, comprising the projections of the regions of interest in said 2D simplified representation (see fig. 9a-c, col. 12, lines 28-67, col. 13, lines 1-18; long-axis views generally coincide with yz-plane 261, the parameter function a3 can capture the longitudinal contraction motion, global translation in the x and the y directions 275, 274, respectively, of the model 2262 frame can be negligible, fig. 9a, a typical motion of an LV model observed at T and T+1, a relatively uniform longitudinal contraction from apex to base can be captured).

Metaxas does not disclose displaying indications of the amplitudes of displacement of the regions of interest of the 3D segmented organ wall in the respective projections of the regions of interest, called segments, in said constructed 2D simplified representation, in a color coded manner.

Ryals teaches displaying indications of the amplitudes of displacement of the regions of interest of the 3D segmented organ wall in the respective projections of the regions of interest,

called segments, in said constructed 2D simplified representation, in a color coded manner (see figure 15, numeral 1528, col. 48, lines 23-46).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Metaxas to display indications of amplitudes of displacement as suggested by Ryals, in order to provide an effective display system allowing efficient location, display and comparison of image frames of the multitude of image frames (see col. 5, lines 1-11).

Regarding **claim 14**, Metaxas with Ryals combination discloses all elements as mentioned above in claim 11. Metaxas with Ryals combination as applied to claim 11 does not teach displaying values of the amplitudes in a color-coded manner.

Ryals, in the same field of endeavor, teaches display displaying values of the amplitudes (figure 13, numeral 1370) in a color-coded manner (figure 15, numeral 1528).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Metaxas with Ryals combination as applied to claim 11 to display values of amplitudes of displacement in a color-coded manner as suggested by Ryals, in order to provide an effective display system allowing efficient location, display and comparison of image frames of the multitude of image frames (see col. 5, lines 1-11).

Regarding **claim 17**, Metaxas discloses all elements as mentioned above in claim 16. Metaxas further discloses construct a first 2D simplified representation of the 3D segmented organ wall by projection of the 3D segmented organ wall along an axis, wherein projections of the regions of interest are part of the 2D simplified representation (see fig. 9a-c, col. 12, lines 28-67, col. 13, lines 1-18; long-axis views generally coincide with yz-plane 261, the parameter function a3 can capture the longitudinal contraction motion, global translation in the x and the y

directions 275, 274, respectively, of the model 2262 frame can be negligible, fig. 9a, a typical motion of an LV model observed at T and T+1, a relatively uniform longitudinal contraction from apex to base can be captured). Metaxas does not disclose displaying indications of the amplitudes of displacement of the regions of interest of the 3D segmented organ wall in segments within the constructed 2D simplified representation, wherein the indications are color-coded.

Ryals, in the same field of endeavor, teaches displaying indications of the amplitudes of displacement of the regions of interest of the 3D segmented organ wall in segments within the constructed 2D simplified representation, wherein the indications are color-coded (see figure 15, numeral 1528, col. 48, lines 23-46).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Metaxas to display indications of amplitudes of displacement as suggested by Ryals, in order to provide an effective display system allowing efficient location, display and comparison of the multitude of image frames (see col. 5, lines 1-11).

Regarding **claim 18**, Metaxas discloses all the elements as mentioned above in claim 16. Metaxas further discloses indications of the maximal or minimal amplitudes of displacement of each of the regions of interest, over a period of time (fig. 9a-c, col. 12, lines 28-67, col. 13, lines 1-18; long-axis views generally coincide with yz-plane 261, the parameter function a3 can capture the longitudinal contraction motion, global translation in the x and the y directions 275, 274, respectively, of the model 2262 frame can be negligible, fig. 9a, a typical motion of an LV model observed at T and T+1, a relatively uniform longitudinal contraction from apex to base can be captured). Metaxas does not disclose displaying indications.

Ryals, in the same field of endeavor, teaches displaying indications (see figure 15, numeral 1528, col. 48, lines 23-46).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Metaxas to display indications of amplitudes of displacement as suggested by Ryals, in order to provide an effective display system allowing efficient location, display and comparison of the multitude of image frames (see col. 5, lines 1-11).

Regarding **claim 20**, Metaxas discloses all the elements as mentioned above in claim 16. Metaxas further discloses indications of the instants of time at which the maximum or minimum of amplitudes of displacements occur in the regions of interest, over a period of time, in said 2D simplified phase representation (see figure 9a-9c; col. 12, lines 45-63). Metaxas does not disclose displaying indications.

Ryals, in the same field of endeavor, teaches displaying indications (see figure 15, numeral 1528, col. 48, lines 23-46).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Metaxas to display indications of amplitudes of displacement as suggested by Ryals, in order to provide an effective display system allowing efficient location, display and comparison of the multitude of image frames (see col. 5, lines 1-11).

Regarding **claim 21**, Metaxas discloses all the elements as mentioned above in claim 16. Metaxas does not disclose displaying the 2D simplified amplitude representation and the 2D simplified phase representation in a same image at the same time.

Ryals, in the same field of endeavor, teaches displaying the 2D simplified amplitude representation and the 2D simplified phase representation in a same image at the same time (figure 13; col. 38, lines 27-48).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Metaxas to simultaneously display the amplitude representations as suggested by Ryals, in order to provide an effective display system allowing efficient location, display and comparison of the multitude of image frames (see col. 5, lines 1-11).

Allowable Subject Matter

9. Claims 12, 15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding claims 12, 15, none of the references of record alone or in combination suggest or fairly teach displaying indications of the maximal or minimal amplitudes of displacement of each of the regions of interest, over a period of time, this first 2D simplified representation being called 2D simplified amplitude representation; constructing a second 2D simplified representation of the 3D segmented organ wall, similar to the first 2D simplified representation of the 3D segmented organ wall, and with similar projections of the regions of interest, called segments, this second 2D simplified representation being called 2D simplified phase representation; displaying indications of the instants of time at which the maximum or minimum of amplitudes of displacements occur in the regions of interest, over a period of time, in said 2D simplified phase representation; and displaying the 2D simplified amplitude

representation and the 2D simplified phase representation in a same image at the same time; wherein displaying indications of the amplitudes of displacement of the regions of interest, and displaying the indications of the instants of time at which the maximum or minimum of amplitudes of displacements occur in the regions of interest in the respective 2D simplified amplitude representation and the 2D simplified phase representation comprises displaying values of the amplitudes and of the instants in time in a color-coded manner.

Conclusion

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to EDWARD PARK whose telephone number is (571)270-1576. The examiner can normally be reached on M-F 10:30 - 20:00, (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Samir Ahmed can be reached on (571) 272-7413. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Edward Park
Examiner
Art Unit 2624

/Edward Park/
Examiner, Art Unit 2624

/Brian Q Le/
Primary Examiner, Art Unit 2624